



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Application of:

Schwartz et al.

Group: 1754

Serial No. 09/929,870

Examiner: Unassigned

Filed: August 14, 2001

Conformation No.: 8997

For: SOLID STATE OXYGEN ANION AND ELECTRON MEDIATING MEMBRANE  
AND CATALYTIC MEMBRANE REACTORS CONTAINING THEM

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INFORMATION DISCLOSURE STATEMENT

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Sir:

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J. Novella

This application is a division/continuation of Application Serial No. 09/748,344 filed December 22, 2000, which is a continuation-in-part of Application Serial No. 09/286,829, filed April 6, 1999 (now U.S. Patent 6,165,431), which is a continuation-in-part of Application Serial No. 08/639,781 filed April 29, 1996 (now U.S. Patent 6,033,632), which is a continuation-in-part of Application Serial No. 08/163,620 filed December 8, 1993, now abandoned.

References 1-39, 53-61 and 64-90 on the enclosed Form PTO 1449 were cited by applicants and the Examiner in the above referenced cases. The Examiner is referred to the files of those applications for prior art of record. References 40-52, 62 and 63 on the enclosed Form PTO 1449 are enclosed for the Examiner's convenience.

References listed on the Form PTO 1449 submitted herewith which do not specify the month of publication have a year of publication sufficiently earlier than the effective US filing date and any foreign priority date so that the particular month of publication is not in issue.

The references and information provided herewith are cited in a spirit of forthrightness and cooperation to enable Applicants to obtain that measure of protection for the invention to which there is entitlement. However, no representation is made that the listed art actually qualifies as prior art under the patent statute and the mere use of Form PTO 1449 is not an admission that all listed references are prior art. No representation is made that Applicants know of the best art.

It is believed that this submission does not require the payment of any fees. If this is incorrect, however, please charge any requisite fees to Deposit Account No. 07-1969.

Respectfully submitted,



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## U.S. PATENT DOCUMENTS

Exmr. Initial		Document Number	Date	Name	Class	Subclass	Filing Date if Appropriate
	1	3,607,863	09/21/71	Dosch	260	209	
	2	3,754,951	08/21/73	Coatney	106	58	
	3	4,083,730	04/11/78	Kwech et al.	106	89	
	4	4,330,633	05/18/82	Yoshisato et al.	501	152	
	5	4,791,079	12/13/88	Hazbun	502	4	
	6	4,793,904	12/27/88	Mazanec et al.	204	59	
	7	4,802,958	02/07/89	Mazanec et al.	204	80	
	8	4,827,071	05/02/89	Hazbun	585	443	
	9	4,848,984	07/18/89	Ezis et al.	51	309	
	10	4,933,054	06/12/90	Mazanec et al.	204	80	
	11	5,160,618	11/03/92	Burggraaf et al.	210	490	
	12	5,160,713	11/03/92	Mazanec et al.	423	210	
	13	5,210,059	05/11/93	Matturo et al.	502	4	
	14	5,240,473	08/31/93	Carolan et al.	95	54	
	15	5,240,480	08/31/93	Thorogood et al.	96	4	
	16	5,306,411	04/26/94	Mazanec et al.	204	265	
	17	5,356,728	10/18/94	Balachandran et al.	429	8	
	18	5,366,712	11/22/94	Violante et al.	423	248	
	19	5,393,325	02/28/95	Edlund	95	56	
	20	5,397,541	03/14/95	Post	422	88	
	21	5,430,209	07/04/95	Agaskar et al.	585	315	
	22	5,466,646	11/14/95	Moser	502	60	
	23	5,534,471	07/09/96	Carolan et al.	502	4	



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	24	5,569,633	10/29/96	Carolan	502	4	
	25	5,591,315	01/07/97	Mazanec et al.	205	462	
	26	5,639,437	06/17/97	Balachandran et al.	423	593	
	27	5,648,304	07/15/97	Mazanec et al.	501	134	
	28	5,693,212	12/02/97	Mazanec et al.	205	462	
	29	5,702,999	12/30/97	Mazanec et al.	501	152	
	30	5,712,220	01/27/98	Carolan et al.	502	400	
	31	5,714,091	02/03/98	Mazanec et al.	252	373	
	32	5,723,035	03/03/98	Mazanec et al.	204	295	
	33	5,744,015	04/28/98	Mazanec et al.	204	295	
	34	5,779,904	07/1998	Ruderman et al.	210	500.25	
	35	5,788,748	08/04/98	Mazanec et al.	96	4	
	36	5,817,597	10/06/98	Carolan et al.	502	400	
	37	5,821,185	10/13/98	White et al.	502	4	
	38	6,010,614	01/04 /00	Keskar et al.	205	765	
	39	6,056,807	05/02/00	Carolan et al.	96	4	

	40	3,535,163	10/20/70	Dzieciuch & Weber	136	6	
	41	5,139,077	08/18/92	Das et al.	164	66.1	
	42	5,580,497	12/03/96	Balachandran et al.	252	519	
	43	5,624,542	04/29/97	Shen et al.	204	283	
	44	5,723,074	03/03/98	Balachandran et al.	252	519	
	45	5,888,272	03/30/99	Prasad et al.	95	54	
	46	5,911,860	06/15/99	Chen et al	204	295	
	47	6,033,632	03/07/00	Schwartz et al.	422	190	



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APPLICANT: Schwartz et al.		GROUP 1754

	48	6,037,514	03/14/00	White et al.	585	520	
	49	6,056,802	5/02/00	Kita et al.	75	249	
	50	6,146,549	11/14/00	Mackay et al.	252	373	
	51	6,165,431	12/26/00	Mackay et al.	413	219	
	52	6,214,757 B1	04/10/01	Schwartz et al.	502	4	

#### FOREIGN PATENT DOCUMENTS

		Document Number	Date	Country	Class	Subclass	Translation Yes/No
	53	WO 97/41060	11/06/97	PCT	C01B 13/00	B01J	
	54	EP 438, 902 B1	05/07/97	EP	H01M 8/10	C25B	
	55	EP 766, 330 A1	04/02/97	EP	H01M 8/12	B01D	
	56	EP 705, 790 A1	04/10/96	EP	C01B 13/02	C04B	
	57	EP 673, 675 A2	09/27/95	EP	B01D 71/02	H01M	
	58	WO 94/24065	10/27/94	PCT	C04B 35/00		
	59	EP 399, 833	11/28/90	EP	B01D 71/02	H01M	
	60	GB 2,203,446 A	10/19/88	GB	C07C 5/32	C25B	
	61	90305684.4	11/28/90	Mazanec et al.			
	62	WO 99/21649	05/06/99	PCT	B01J 19/24	19/00	

#### OTHER PRIOR ART (including Author, Title, Date, Pertinent Pages, etc.)

	63	Berry, L.G. and Mason B., (1983) <i>Mineralogy</i> , 2 <sup>nd</sup> Edition, W. H. Freeman and Co. New York pp 257,364,369,372,-373
	64	"The Periodic Table of Elements" <i>IUPAC</i> (1983)
	65	Chick, L.A. et al., (Sept 1990) "Glycine-nitrate combustion synthesis of oxide ceramic powders," <i>Mater. Lett.</i> 10(1,2):6-12
	66	Cook, R.L. and Sammells, A.F., (1991) "On the systematic selection of perovskite solid electrolytes for intermediate temperature fuel cells," <i>Solid State Ionics</i> 45:311-321



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APR 30 2002  
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Form PTO-1449		
ATTY DOCKET NO. 91-95 E	SERIAL NO. 09/929,870	FILING DATE: August 14, 2001
APPLICANT: Schwartz et al.		GROUP 1754

67	Cook, R.L. et al., (Oct 1990) "Perovskite Solid Electrolytes for Intermediate Temperature Solid Oxide Fuel Cells," <i>J. Electrochem. Soc.</i> <b>137</b> :3309-3310
68	Crespin, M. and Hall, K.W., (1981) "The Surface Chemistry of Some Perovskite Oxides," <i>J. Catal.</i> <b>69</b> :359-370
69	Gallagher, P.K. et al., (Oct 1964) "Mössbauer Effect in the System $\text{SrFeO}_{2.5-3.0}$ ," <i>J. Chem. Phys.</i> <b>41</b> (8):2429-2434
70	Goodenough et al., (1990) "Oxide-ion conduction in $\text{Ba}_2\text{In}_2\text{O}_5$ and $\text{Ba}_3\text{In}_2\text{MO}_8$ ( $\text{M}=\text{Ce}, \text{Hf}, \text{or Zr}$ )," <i>Solid State Ionics</i> <b>44</b> :21-31
71	Greaves, C. et al., (1975) "A Powder Neutron Diffraction Investigation of the Nuclear and Magnetic Structure of $\text{Sr}_2\text{Fe}_2\text{O}_8$ ," <i>Acta Cryst.</i> <b>B31</b> :641-646
72	Hawley's Condensed Chemical Dictionary. 13 <sup>th</sup> Ed., Revised by Richard J. Lewis Sr., John Wiley's Sons, Inc. USA ISBN 0-471-29205-2, page 852
73	Kuchynka, D.J. et al., (May 1991) "Electrochemical Natural Gas Conversion to More Valuable Species," <i>J. Electrochem. Soc.</i> <b>138</b> (5):1284-1299
74	Matsumoto, Y. et al., (Nov 1980) "Oxygen Evolution on $\text{La}_{1-x}\text{Sr}_x\text{Fe}_{1-y}\text{Co}_y\text{O}_3$ Series Oxides," <i>J. Electrochem. Soc.</i> <b>127</b> (11):2360-2364
75	Pederson, L.R. et al., (Feb 1991) "Combustion synthesis of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ :glycine/metal nitrate method," <i>Mater. Lett.</i> <b>10</b> (9,10):437-443
76	Pujare, N U and Sammells, A.F., (Oct 1988) "Methane Activation to $\text{C}_2$ Hydrocarbon Species in Solid Oxide Fuel Cell," <i>J. Electrochem. Soc.</i> <b>135</b> (10):2544-2545
77	Rostrup-Nielsen, J.R. and Bak Hansen, J. H., (1993) " $\text{CO}_2$ -Reforming of Methane over Transition Metals," <i>J. Catalysis</i> <b>144</b> :38-49
78	Sammells, T., (Sept 1991), "Rational Selection of Perovskites for Solid Electrolytes and Electrocatalysis," <i>Presented at BP America Research, Warrenville Research Center, September 16, 1991, 46pp</i>
79	Sammells, A.F. and Cook, R.L., (1991), "Rational Selection of Advanced Solid Electrolytes for Intermediate Temperature Fuel Cells," presented at the Ceramic Conductors for Solid-State Electrochemical Devices Meeting, May 12-15, 1991, Snowbird, UT, <i>Solid State Electrolytes</i> <b>2</b> :111-123
80	Sammells, A.F. et al., (1992) "Rational selection of advanced solid electrolytes for intermediate temperature fuel cells," <i>Solid State Ionics</i> <b>52</b> :111-123
81	Schwartz, M. et al., (April 1993) "New Brownmillerite Solid Electrolytes," <i>J. Electrochem. Soc.</i> <b>140</b> (4):L62-L63



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APR 30 2002  
TC 1700

Form PTO-1449		
ATTY DOCKET NO. 91-95 E	SERIAL NO. 09/929,870	FILING DATE: August 14, 2001
APPLICANT: Schwartz et al.		GROUP 1754

		82	Shin, S. and Yonemura, M., (1978) "Order-Disorder Transition of $\text{Sr}_2\text{Fe}_2\text{O}_5$ from Brownmillerite to Perovskite Structure at an Elevated Temperature," <i>Mat. Res. Bull.</i> 13:1017-1021
		83	Teraoka, Y. et al., (1989) "Development of Oxygen Semipermeable Membrane Using Mixed Conductive Perovskite-Type Oxides (Part 1)," <i>J. Ceram. Soc. Jpn. Inter. Ed.</i> 97:458-462
		84	Teraoka, Y. et al., (1985) "Oxygen Permeation Through Perovskite-Type Oxides," <i>Chem. Lett.</i> 1743-1746
		85	Teraoka, Y. et al., (1988) "Effect of Cation Substitution on the Oxygen Semipermeability of Perovskite-type Oxides," <i>Chem. Lett.</i> 503-506
		86	Teraoka, Y. et al., (1989) "Development of Oxygen Semipermeable Membrane Using Mixed Conductive Perovskite-Type Oxides (Part 2)," <i>J. Ceram. Soc. Jpn. Inter. Ed.</i> 97:523-529
		87	Teraoka, Y. et al., (1988) "Mixed Ionic-Electronic Conductivity of $\text{La}_{1-x}\text{Sr}_x\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-\delta}$ ," <i>Mat. Res. Bull.</i> 23:51-58
		88	Teraoka, Y. et al., (1985) "Oxygen-Sorptive Properties of Defect Perovskite-Type $\text{La}_{1-x}\text{Sr}_x\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-\delta}$ ," <i>Chem. Lett.</i> 1367-1370
		89	van der Pauw, L.J., (Feb 1958) "A Method of Measuring Specific Resistivity and Hall Effect of Discs of Arbitrary Shape," <i>Philips Res. Rep.</i> 13(1):1-9
		90	Zhen, Y.S. and Goodenough, J.B., (1990) "Oxygen-Ion Conductivity in $\text{Ba}_8\text{In}_6\text{O}_{17}$ ," <i>Mat. Res. Bull.</i> 25:785-790
EXAMINER			DATE CONSIDERED
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

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